percent less expensive). For example, in one of SBMS's out-of-region markets, SBMS's special access (i.e., point-to-point interconnection for cell site-to-cell site or cell site-to-switched transmission) consists of leased facilities from the incumbent LEC, an extensive SBMS-owned microwave backbone network, and high capacity fiber service leased from CAPs.

In addition, in many markets, there are multiple access tandems to which CMRS calls can be terminated. For example, within SWBT's five-state territory, there are alternative access tandems in virtually every market where SBMS and SWBT operate. In most instances, these tandems are owned by independent telephone companies that have both the incentive and the regulatory flexibility to negotiate the access charges which will be assessed. SBMS and, presumably, other CMRS providers, take full advantage of these alternatives.

Further, SBMS negotiates with numerous alternative providers of switched access services. An example of these alternatives is found in SBMS's Boston cellular market. SBMS's Boston cellular system terminates a substantial portion of its core local traffic to Teleport's local Boston switch, which operates much like an access tandem. These services are provided pursuant to an agreement between Teleport and SBMS in the Boston market at a substantial savings over standard LEC access tandem termination rights. In addition, the agreement provides for payment of mutual compensation for termination of traffic onto the cellular network. SBMS is currently negotiating with CAPs in a number of other markets for similar switched access interconnection arrangements.[48]

The opportunities are numerous. For example, MFS is currently operating facilities connected to over 20 Bell Atlantic end offices in Maryland LATA 236 and another eight

[48] For competitive reasons, SBC will not identify the particular market at issue.

Bell Atlantic end offices in Maryland LATA 238. TCG has proposed a switched access trial in Baltimore. The availability of this option is in addition to the availability of a GTE access tandem in the area. SBMS is negotiating with each of these companies regarding switched access alternatives.

Wireless carriers have numerous options and enormous bargaining power in negotiating with LECs--both incumbent and new entrant. With the advent of additional wireless carriers and alternative LECs all competing for access customers, the bargaining power of CMRS providers will only be enhanced. This is particularly true where there exists a disparity in the flow of traffic, such as exists between LEC and CMRS networks today. High volume generators of traffic which will terminate on a local service provider network are extremely valuable customers today, and that value will only grow as additional networks are constructed.

E. SBC PROPOSES GENERAL PRINCIPLES FOR INTERCONNECTION NEGOTIATIONS

1. OVERVIEW OF INTERIM PROPOSAL

The status of LEC/CMRS interconnection that the NPRM portrays, is demonstrably non-existent. At the same time, it is almost universally accepted that current interconnection and exchange access pricing structures are unacceptable for the future, where cost-based, market-driven, "Minute-is-a-Minute" prices for interconnection will be the standard--at least after all necessary regulatory initiatives are completed. "Bill and keep," however, not only does not advance the industry toward the Minute-is-a-Minute goal, but actually propels the industry away from that goal by suggesting the implementation of an economically unsound structure. The Commission's tentatively concluded remedies are neither warranted nor necessary.

Instead, when the amounts of interchanged traffic are unequal, as is the case with LEC/CMRS interconnection, the most economically rational method of intercompany compensation for traffic termination is to settle on the basis of a per minute charge. This principle holds true for local service providers generally, whether an incumbent LEC, a new local service provider, or a CMRS provider. SBC, therefore, proposes that LECs and CMRS providers charge each other on a per minute basis for terminating traffic, with rate levels to be set above cost through negotiations between interconnecting carriers. At the same time, and in recognition of the modified relationships that will arise among the providers of landline telephone exchange and CMRS services, new rates will necessarily be negotiated for any services that CMRS providers typically now receive, some of which have been provided without separate charge from the interconnecting LEC.[49]

Under this plan, terminating access rates will be equal between local service providers when they are regulated equally and have the same universal service and carrier of last resort obligations. On an interim basis, however, the charges for terminating traffic will not be equal. Instead, recognizing the current reality of incumbent LEC cost of universal service and provider of last resort responsibilities, coupled with regulatory price constraints that artificially inflate certain LEC rates, SBC's plan envisions that LECs will be compensated at a higher rate for terminating CMRS local traffic than CMRS providers will be compensated for terminating LEC

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[49]These services could include expanded local calling scope telephone numbers for CMRS assignment (e.g., "metro" numbers); "local" interconnection rates for interexchange calls; and access to intercept services, operator services, directory listings, SS7 interconnection, 800 access service, and line information database ("LIDB") service. Compensation for each of these ancillary services could be based upon a minute of use charge, a flat monthly or nonrecurring fee, a per-use fee, or any other basis agreeable to the parties through negotiation.

local traffic. SBC's plan envisions that this situation will evolve over time to equal rates for all terminating traffic.

2. INTERCONNECTION PRINCIPLES AND INTERIM COMPENSATION SCHEME

Although terminating rates are just one aspect of any interconnection agreement, that issue has the greatest probability of being contentious. Adopting a policy framework for negotiating rates could be helpful in avoiding unnecessary disputes or delays. The basic principles and mechanisms for obtaining minute is a minute pricing for interconnection are contained within the Telecommunications Act.

SBC submits that the following should be the basis of all local interconnection:

- Local service providers that permit their customers to originate local traffic that terminates on a interconnecting local service provider's network must compensate the terminating local service provider for completing the calls on a basis approved pursuant to the Telecommunications Act.

- Prior to the completion of the Regulatory Task List,[50] the applicable rates that may be charged for terminating local traffic which originates on a different local service provider's network:

  - Must be negotiated, mediated, or arbitrated between the respective local service providers pursuant to the provisions of the Telecommunications Act;

  - May be unequal, may reflect differences in the values of the respective

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[50] "REGULATORY TASK LIST." For purposes of this discussion , the term "Regulatory Task List" means the Commission and state regulatory rulemakings or other initiatives which remove the cost of implicit universal service support and carrier of last resort obligations, if any, from the regulated rate structures of local exchange carriers. The Regulatory Task List includes, but is not limited to, proceedings to accomplish interconnection charge reform; access charge structure reform; local exchange carrier rate rebalancing and geographic rate deaveraging. The Regulatory Task List also includes the introduction of explicit, equitable, non-discriminatory, targeted, competitively neutral universal service support and carrier of last resort support funded by all providers of telecommunications services. See generally Sections 214(e) and 254.

networks, and must be based on the different network costs of the terminating traffic; and

- May reflect differences in the universal service or carrier of last resort obligations of the respective local service providers.

Consistent with the "minute is a minute" vision, basic terminating rates should be differentiated on a consistent basis by a provider and between providers based upon where interconnection occurs and the costs required to complete the call. That is, all local service providers that deliver traffic for termination should pay for what they use. The rates for network interconnection at a local tandem, for instance, should reflect access to all end offices that subtend that tandem, while rates for interconnection at end offices should reflect only the cost of access to the end users served out of that office.[51] On top of this basic termination rate, however, should be a surcharge that reflects the cost of universal service and carrier of last resort obligations of incumbent LECs that are or would be eligible telecommunications carriers.[52]

As discussed above, the Commission should not, under the terms of the Telecommunications Act, attempt to impose any of the terms or conditions of interconnection among telecommunications carriers; however, the foregoing equitable principles could be adopted through a policy statement to enable telecommunications carriers to focus their negotiations.

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[51] Such a differential has recently been adopted in Illinois and Maryland, where tandem and end office interconnection/access charges vary. While the rates and the size of the variance may be subject to debate and is without question the subject of negotiation, the principle is appropriate.

[52] "ELIGIBLE TELECOMMUNICATIONS CARRIER." The term "Eligible Telecommunications Carrier" means a telecommunications carrier that (a) offers all universal service level telecommunications services defined by the Commission in conjunction with the Joint Board under the provision of Section 254 by means of its own facilities or by means of a combination of its own facilities or resale of another carrier's services, and (b) advertises those services. Section 214(e)(1).

3. UNEQUAL MUST BECOME EQUAL

Although the focus of this proceeding is LEC/CMRS interconnection, SBC's interim interconnection principles hold true for all forms of interconnection. CMRS providers, not being burdened with universal service obligations, carrier of last resort obligations, and state regulation, will pay more to interconnect with LECs than vice-versa. Without question, this inequality in charges places a burden upon CMRS providers, although not an unfair burden and less of a burden than the NPRM alleges to exist. However, neither CMRS providers, nor any other telecommunications carriers other than incumbent LECs, carry the burden of universal service and carrier of last resort obligations. When the Commission and the states complete the Regulatory Task List, negotiated interconnection agreements will be founded in negotiations based upon Minute is a Minute principles.[53] In the final analysis, SBC's proposal is a step toward Minute is a Minute principles, while bill and keep is a step backward. To the extent that the Commission must do anything in this proceeding, it must affirm the policy that the institution of Minute is a Minute principles is the ultimate goal of any interim measures negotiated among the parties to interconnection agreements and approved pursuant to the provisions of Section 252.

[53] Indeed, Section 214(e)(2) of the Telecommunications Act specifically contemplates more than one "eligible telecommunications carrier" in urban areas, in stating that "State commissions shall, in the case of all other [i.e., non-rural] areas, designate more than one common carrier as an eligible telecommunications carrier . . ." Id. The Telecommunications Act places no limits on the type of carrier or technology used by the designated carrier.

III. CONCLUSION AND NEXT STEPS: ALTHOUGH IT CANNOT IMPOSE AN INTERCONNECTION SCHEME EXCEPT AS PERMITTED UNDER THE TELECOMMUNICATIONS ACT, THE COMMISSION SHOULD MOVE EXPEDITIOUSLY TO FACILITATE THE REALIZATION OF THE "MINUTE IS A MINUTE" WORLD OF INTERCONNECTION, NOT ONLY FOR LEC/CMRS, BUT FOR ALL INTERCONNECTION

The existing system of interconnection and access rates for the various services requiring interconnection is unacceptable in a fully competitive environment. However, the existing system is the result of decades of regulation. The societal mandate for universal service has spawned a regulated, residually-priced local exchange rate structure. Within this framework, residually priced services have promoted the goal of universal service, but at the cost of imbalanced LEC rate structures. These forces have dictated that the pricing of interconnection, including the subspecies of interexchange access and CMRS interconnection, exceed incremental cost by a factor which is far greater than a market-driven profit. The same may be said for numerous other LEC services. In turn, access bypass and arbitrage have become prevalent, and niche competitors have entered into those parts of the local exchange market that promise the highest potential profit margin. The migration of high margin services to competitors in turn increases pressure upon the imbalanced LEC rate structure.

As is acknowledged by the Commission in the NPRM, however, the future of the interconnected "network of networks" will be driven by certain principles:

- Multiple, efficient, technologically diverse networks will be interconnected in a manner which functions in an integrated manner and appears seamless from the consumer's perspective.

- Market and cost-driven pricing will apply to all telecommunications services, including all species of interconnection.

The result of the application of these principles is that pricing for functionally similar, if not

functionally equivalent, telecommunications services will approach their cost and will be available to all classes of consumers at similar, market-based rates, regardless of the technology used to deliver them.[54] In the interim, however, the uneasy marriage of regulation and competition must be managed by principles and through proceedings that all commenters in this Docket will undoubtedly agree are appropriate.

While the Commission can no longer mandate the terms or conditions interconnection, the initiation and completion of proceedings dealing with other, inextricable issues must be made a priority. The Commission must initiate and complete proceedings that fairly distribute the financial obligations to provide universal service and permit LECs to rebalance their rate structures. The completion of all of the proceedings necessarily implicated by the resolution of these issues will permit economically, technologically, and competitively neutral interconnection rates, including rates for CMRS interconnection, to be negotiated more easily.

To reach those goals, the following must be considered:

- Implicit mechanisms for the support of universal service and carrier of last resort obligations must be eliminated and replaced with explicit, competitively neutral mechanisms.
- The Commission must target universal service support where it is needed. Today's universal service support mechanisms provide support to all customers indiscriminately. Support should be targeted to areas where costs are relatively high, and to those customers who need help staying on the network.
- The Commission must establish alternative, competitively-neutral methods of recovering non-traffic sensitive costs.[55]

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[54] See NPRM at 3-10.

[55] Alternative methods of recovering these costs include shifting recovery to the subscriber line charge ("SLC"), billing interexchange carriers using a competitively neutral mechanism (e.g.,

- The Commission must allow LEC rate deaveraging to the extent permitted by law.[56]

- The Commission must institute proceedings that allow LEC rate balancing and allow LECs greater pricing flexibility. Rate rebalancing should be used to remove implicit support to the extent possible. Pricing freedoms would also permit market-driven solutions.

- The Commission must permit capital recovery of under-depreciated LEC plant put into service under the regulatory social contract.[57]

- The Commission must restructure interstate local switching rates. Separate recovery of costs associated with customer connection to the switch should be considered, with the costs removed from local switching rates.

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bulk-bill on minutes of use), and recovering common line costs related to pay telephones through a pay telephone use fee. Still, at least on an interim basis it must be recognized that until the full panoply of competitive restructure of service prices occurs, interconnection prices, including switched access, while subject to the negotiation requirements of Section 252, must be permitted to provide for the efficient recovery of non-traffic sensitive costs currently recovered through mechanisms such as the carrier common line ("CCL") rate. In the interim, the Commission must remove long-term support recovery from LEC CCL rates. Assigning these costs to only one provider in a market arbitrarily disadvantages that provider and its customers. Sharing such costs on a competitively neutral basis permits the recovery of universal service costs without the threat of unjustified and uneconomic losses as competition continues to grow and prices are driven closer to incremental costs.

[56] See Section 403(d).

[57] Depreciation rates have also been used by regulators as a tool to promote universal service. Lengthening depreciation lives served to decrease depreciation expense which reduced revenue requirements and pricing levels. Even as the recovery of investment was delayed beyond economic lives, recovery was possible where competition was less prevalent. With increased competition and advancements in technology, LECs are now faced with the problem of under-depreciated investment while at the same time needing to accelerate network investment to compete with new entrants using the latest technologies. Under-depreciated investment denies the public the full benefits of newer technologies and places LECs at a competitive disadvantage. LECs should be afforded the opportunity to accelerate the recovery of this investment, as well as devalued investment, and to establish depreciation rates which better reflect market conditions. See also USTA comments filed in Simplification of the Depreciation Prescription Process, CC Docket 92-296, Notice of Proposed Rulemaking, 8 FCC Rcd 915 (1992).

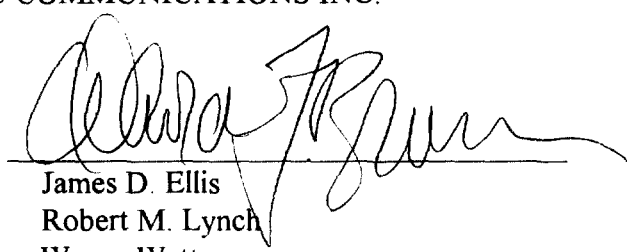
- The Commission must restructure the Transport Interconnection Charge.
- The Commission must eliminate the Enhanced Service Provider Exemption.

These and other issues and alternatives must be addressed, debated, and satisfactorily resolved before the vision of a "Minute is a Minute" pricing can be reached.

The passage of the federal legislation, with its mandate that universal service and others support mechanisms be made explicit, equitable, and non-discriminatory, necessarily implicates the wide range of LEC rate restructuring. It is unreasonable to assume that major competitive benefits can be achieved when virtually every regulated LEC service is subject to massive explicit and implicit price distortions as the result of regulatory policies. Restructuring rates will take the industry far along the path to an economically sound vision while at the same time affirming the industry's commitment to universal service.

Although the philosophical and economic policy underpinnings of this proceeding remain the same now as before the enactment of the Telecommunications Act, the Commission's role in balancing regulation and competition in the interconnection context has changed. Because of Congress' mandate, the Commission must accept that a specific mechanism has been chosen to reach interconnection arrangements: Negotiation. Because of this, the Commission should terminate this proceeding, allow the parties to fulfill their duties under the Telecommunications Act, and turn its attention to the initiatives necessary to reach the Commission's long-term goals.

SBC COMMUNICATIONS INC.

BY: 

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March 4, 1996

ATTACHMENT A

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COMMONWEALTH OF MASSACHUSETTS

DEPARTMENT OF PUBLIC UTILITIES

TESTIMONY OF

JERRY A. HAUSMAN

ON BEHALF OF

CELLULAR ONE

D.P.U. 94-185

May __, 1995

My name is Jerry A. Hausman. I am the MacDonald Professor of Economics at the Massachusetts Institute of Technology in Cambridge, Massachusetts.

I received an A.B. degree from Brown University and a B.Phil. and D.Phil (Ph.D.) in Economics from Oxford University where I was a Marshall Scholar. My academic and research specialties are econometrics, the use of statistical models and techniques on economic data, and microeconomics, the study of consumer behavior and the behavior of firms. I teach a course on "Competition in Telecommunications" to graduate students in economics and business at MIT each year. Mobile telecommunications, including competitive and technological developments in cellular, ESMR, satellite, and PCS, are some of the primary topics covered in the course.

I was a member of the editorial board of the Rand (formerly the Bell) Journal of Economics for the past 13 years. The Rand Journal is the leading economics journal of applied microeconomics and regulation. In December 1985, I received the John Bates Clark Award of the American Economic Association for the most "significant contributions to economics" by an economist under forty years of age. I have received numerous other academic and economic society awards. My curriculum vitae is attached as Exhibit A.

I have done significant amounts of research in the telecommunications industry. My first experience in this area was in 1969, when I studied the Alaskan telephone system for the Army Corps of Engineers. Since then, I have studied the demand for local measured service; the demand for intrastate toll service; consumer demands for new types of telecommunications technologies; marginal costs of local service; costs and benefits of different types of local services, including the effect of higher access fees on

consumer welfare; demand and prices in the cellular telephone industry; the effects of regulation on the cellular industry, and consumer demand and benefits from new types of pricing options and new telecommunications services. I have studied the effects of new entry on competition in paging markets, telecommunications equipment markets, exchange access markets, and interexchange markets and have published a number of papers in academic journals about telecommunications. I have edited two recent books, Future Competition in Telecommunications (Harvard Business School Press, 1989) and Globalization, Technology, and Competition in Telecommunications (Harvard Business School Press, 1993).

I have been involved in the cellular industry since 1984. I participated in PacTel's purchase of Communications Industries in 1985 and have provided testimony on previous occasions on cellular competition and regulation to the California PUC, the North Carolina PSC, and the Connecticut DPUC. I also previously submitted testimony to the FCC on questions of cellular regulation, including whether cellular companies should be allowed to bundle cellular CPE with cellular service and whether the FCC should forbear from regulation of mobile service providers. During the PCS proceedings I filed affidavits which considered eligibility questions for LECs; the presence of economics of scale and scope in providing PCS; the design of an appropriate auction framework for PCS spectrum; spectrum allocation and band size; eligibility for in-region cellular companies; and the appropriate framework for pioneer preferences. I was an invited speaker at the FCC Task Force meeting on PCS held on April 11, 1994. I also have done significant academic research in mobile telecommunications, and it is one of the primary topics in my course, "Competition in Telecommunications."

I testified before the California PUC in Phase II of the Alternative Regulatory Frameworks proceedings for LECs in 1988 and 1989. I submitted testimony in Phase III of the Alternative Regulatory Frameworks for LECs in 1990, 1991, 1992 and 1993. The latter hearings dealt, in large part, with the proper competitive framework once competitive entry was allowed in California. I testified in Maryland in 1990 on behalf of Bell Atlantic-Maryland, Inc. These hearings dealt with the proper competitive framework and imputation rules for the provision of Centrex by Bell Atlantic-Maryland. I also testified in Maryland in 1994 on behalf of SBC Media Ventures, Inc. on local exchange and competition issues.

I have submitted numerous affidavits to Judge Harold Greene on behalf of the BOCs regarding waivers to the MFJ.

The purpose of my testimony here is to address certain of the issues that the Department has identified as appropriate for consideration in this proceeding. It is my understanding that the purpose of this proceeding is to determine and put into place the structural framework necessary to ensure the continued development of competitive telecommunications markets in Massachusetts.

The advent of competition, when accompanied by a proper regulatory framework, will almost always make consumers better off. Consumers will have greater choice regarding their telecommunications needs, and expanded consumer choice leads to increased consumer welfare. In general, higher quality services, lower prices and more innovative services should develop more quickly because of competition. This outcome will benefit Massachusetts consumers.

I will now address four of the issues identified in the Hearing Officer Ruling on the scope of the proceeding. I wish to reserve my right to address additional issues and

to respond to the comments of other parties on these and other issues in rebuttal testimony.

Network Interconnection and Compensation Arrangements

The Department should require New England Telephone and Telegraph Company ("NYNEX") and other local exchange carriers to provide interconnection on reasonable economic terms to cellular providers. In providing this interconnection, the principle of mutual compensation should apply. Local exchange carriers should compensate cellular providers for the reasonable economic costs incurred by the cellular providers in terminating traffic that originates on local exchange carrier facilities. Similarly, cellular providers should provide reasonable economic compensation to local exchange carriers for traffic originating with cellular users and terminating on the facilities of the local exchange carrier.

To promote economic efficiency, network interconnection rates should be set at long-run incremental (marginal) costs, because interconnection is an intermediate good. If prices for an intermediate good (or input of production) exceed costs, the user of the intermediate good will tend to shift to a lower priced, but potentially higher cost, input because the price is lower. But economic efficiency states that the lowest cost input should be used, or else society's resources are wasted. This loss of production efficiency is an aspect of the overall loss in economic efficiency that occurs if interconnection rates are set higher than incremental cost.

Although I support long-run incremental costs as the preferred approach, I recognize that rates for similar services have sometimes included, in addition to long-run incremental cost, some amount of "contribution" above incremental costs. That

contribution is intended to compensate a company for certain fixed and common costs. If the Department believes that such an addition to incremental costs is appropriate, I offer the following observations.

The amount of contribution which is appropriate will depend on the extent of future competition and the extent to which residential telephone rates are kept low. The Department should distinguish the issue of recovering fixed and common costs from the issue of subsidies which may be deemed necessary for the promotion of universal service. As I mention below, such subsidies should be explicitly identified and dealt with through a universal service fund. The Department should not confuse the potential need for such subsidies with the issue of recovering fixed and common costs in interconnection rates. To the extent that the Department determines that targeted subsidies for residential services, together with a universal fund, are appropriate policy, the requirement for contribution will be smaller and prices can be set more in line with costs.

However, I do not believe a cost study can be performed which will provide an economic basis for allocating fixed and common costs to interconnection rates rather than to some other service. No economic basis exists to assign fixed and common costs to different services, because the particular services do not cause the fixed and common costs. Thus, without causation no economic basis exists to assign the costs to a given service.

Currently, Cellular One pays NYNEX an interconnection charge when sending traffic to NYNEX. However, NYNEX does not pay a similar interconnection charge to Cellular One when NYNEX delivers a call to the Cellular One system. This lack of reciprocal pricing leads to economic inefficiency and reduced competition.

The current interconnection charge is well in excess of incremental costs. Also, NYNEX's interconnection rates to Cellular One do not reflect the network efficiencies and cost savings that Cellular One provides for NYNEX, such as preswitching traffic and passing it to the least cost NYNEX tandem or end office. Interconnection charges should be designed to reflect economic costs. Paul J. Saur, Vice President of Network Operations for Cellular One, who has also submitted testimony in this proceeding, will be able to respond to questions concerning the specifics of these network efficiencies.

The Department should indicate its support for the principles of reciprocal compensation and interconnection based on incremental costs. It should encourage carriers to negotiate mutually agreeable arrangements for network interconnection and compensation. Negotiated agreements are likely to encourage an economically efficient and technically flexible solution, which will benefit the customers of each carrier. If the companies involved are unable to come to an agreement, the Department should arbitrate the differences that may exist and determine reasonable terms and compensation for interconnection.

Cost Studies

I do not believe that a new cost methodology study by NYNEX is necessary to ensure the development of open markets and competition in the Commonwealth. It is my understanding that the incremental cost methodology previously used by the Department to determine NYNEX's incremental costs in D.P.U. 86-33-G (1989) remains valid. As I mentioned in the previous section, full cost allocation studies are inherently arbitrary. The Department does not need such a study to make the necessary

regulatory changes to encourage further competition in the local exchange and intraLATA toll markets.

Universal Service Funding

Universal service is an important goal for telecommunications regulation. I believe the Department should establish a universal service fund or universal service funding mechanism to be used to provide targeted subsidies for service areas with high costs and for certain groups of low-income customers. Targeted subsidies allow policy goals to be met without creating unnecessary economic distortions and losses in economic efficiency, which broad-based subsidies create. This economic consideration is particularly important as competition increases in telecommunications.

If the Department continues its rate restructuring policies toward cost-based rates, the current subsidies provided to residential telephone service from access and other charges will decrease. A universal service fund should be established to provide the subsidy to residential telephone service previously provided by access and other charges that are above incremental cost.

Subsidies from a universal service fund should not be provided to all residential customers, since one of the goals of competition is to have price based on economic costs. Subsidies should only be provided to high cost geographical areas or to certain economically disadvantaged individuals or households (such as "lifeline" customers) who would otherwise have unacceptably low access to telephone service. The fund should not be distributed indiscriminately to all residential users regardless of income or geographic area. A general subsidy to all households, as now occurs, serves no useful economic or policy purpose. The outcome is a large amount of economic inefficiency and

reduced consumer welfare. Only those customers who cannot afford telephone service should receive a targeted subsidy. There is no reason to subsidize people who are well-off.

The responsibility for universal service funding should be placed on all telecommunications providers in Massachusetts. I recommend that payments to the universal service fund be based on final demand revenues, and not intermediate input demand revenues such as access demand. I make this recommendation because taxes on intermediate inputs tend to lead to large losses in economic efficiency, as I discussed previously. I would suggest a universal service charge based on a percentage of monthly collected revenues. With a narrowly targeted subsidy program, the required contribution to the fund, as a percentage of revenues, would be relatively small, and would benefit consumers by decreasing current distortions in both competition and service prices. Overall, consumers' average bills would decrease, and consumer welfare would increase significantly with this policy change.

An independent body should administer the universal service fund and distribute funds to carriers as a subsidy for providing certain services at a price lower than the cost of providing the service. The fund should be collected and distributed in a competitively neutral manner. The Department should resolve universal service funding issues relatively quickly, because the uncertainty with respect to the nature and extent of such funding will have impacts on decisions with respect to competitive entry into the local and intraLATA markets.

This concludes my testimony.

EXHIBIT A

April 1995

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EDUCATION:

OXFORD UNIVERSITY
D. Phil. 1973 (Ph.D)
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BROWN UNIVERSITY
A.B. (Summa Cum Laude), 1968

THESIS: "A Theoretical and Empirical Study of Vintage Investment and Production in Great Britain," Oxford University, 1973.

FELLOWSHIPS, HONORS AND AWARDS:

Phi Beta Kappa
Marshall Scholar at Oxford, 1970-1972
Scholarship at Nuffield College, Oxford, 1971-1972
Fellow of Econometric Society, 1979.
Frisch Medal of the Econometric Society, 1980
Fisher-Schultz Lecture for the Econometric Society, 1982
John Bates Clark Award of the American Economic Association, 1985
Jacob Marschak Lecture for the Econometric Society, 1988
American Academy of Arts and Sciences, 1991.

EMPLOYMENT:

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

1992-	John and Jennie S. MacDonald Professor
1979-	Professor, Department of Economics
1976-79	Associate Professor, Department of Economics
1973-76	Assistant Professor, Department of Economics
1972-73	Visiting Scholar, Department of Economics

VISITING APPOINTMENTS:

1986-87	Visiting Professor, Harvard Business School
1982-83	Visiting Professor, Harvard University Department of Economics

U.S. ARMY, ANCHORAGE, ALASKA

1968-70	Corps of Engineers

PROFESSIONAL ACTIVITIES:

Associate Editor, Bell Journal of Economics, 1974-1983
Associate Editor, Rand Journal of Economics, 1984-1988
Associate Editor, Econometrica, 1978-1987
Reviewer, Mathematical Reviews, 1978-1980
American Editor, Review of Economic Studies, 1979-82
Associate Editor, Journal of Public Economics, 1982-
Associate Editor, Journal of Applied Econometrics, 1985-1993
Member of MIT Center for Energy and Environmental Policy Research, 1973-
Research Associate, National Bureau of Economic Research, 1979-
Member, American Statistical Association Committee on Energy Statistics, 1981-1984
Special Witness (Master) for the Honorable John R. Bartels, U.S. District Court for the Eastern District of New York in Carter vs. Newsday, Inc., 1981-82
Member of Governor's Advisory Council (Massachusetts) for Revenue and Taxation, 1984-1992
Member, Committee on National Statistics, 1985-1990
Member, National Academy of Social Insurance, 1990-
Member, Committee to Revise U.S. Trade Statistics 1990-1992
Director, MIT Telecommunications Economics Research Program, 1988-
Board of Directors, Theseus Institute, France Telecom University, 1988-
Member, Conference on Income and Wealth, National Bureau of Economic Research, 1992-

PUBLICATIONS:

I. Econometrics

"Minimum Mean Square Estimators and Robust Regression," Oxford Bulletin of Statistics, April 1974.

"Minimum Distance and Maximum Likelihood Estimation of Structural Models in Econometrics," delivered at the European Econometric Congress, Grenoble: August 1974.

"Full-Information Instrumental Variable Estimation of Simultaneous Equation Models," Annals of Economic and Social Measurment, October 1974.

"Estimation and Inference in Nonlinear Structural Models," Annals of Economic and Social Measurement, with E. Berndt, R.E. Hall, and B.H. Hall, October 1974.

"An Instrumental Variable Approach to Full-Information Estimators in Linear and Certain Nonlinear Econometric Models," Econometrica, May 1975.

"Simultaneous Equations with Errors in Variables," delivered at Winter Econometric Meetings, San Francisco: December 1974; published in Journal of Econometrics 5, 1977, pp. 389-401.

"Social Experimentation, Truncated Distributions, and Efficient Estimation," delivered at the World Econometric Congress, Toronto: August 1975; Econometrica, with D. Wise, June 1977.

"A Conditional Probit Model for Qualitative Choice," delivered at World Econometric Congress, Toronto: August 1975; MIT Working Paper 173, April 1976; Econometrica, with D. Wise, March 1978.

PUBLICATIONS cont.:

"Specification Tests in Econometrics," MIT Working Paper 185, June 1976; Econometrica, 1978.

"Non-Random Missing Data," with A.M. Spence, MIT Working Paper 200, May 1977.

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